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AUTHOR Joseph, John J.
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ABSTRACT

The Fox Valley Technical Institute's approach to teaching adults about computers is based on three underlying premises: there is a widespread need for adult education related to desktop computers; the needs are not the same for everyone; and to be effective, a program that addresses these needs must be flexible, pertinent, and current. (Desktop is a generic term, representing home computers, microcomputers, personal computers, and small business computers). The course hierarchy is explained and illustrated and the content and objectives of 11 4-week modules are outlined: Introduction to Desktop Computers, BASIC for Desktop Computers I and II, File Processing in BASIC, BASIC in the Classroom, Business Applications in BASIC, System Design for Desktop Computers I and II, Spreadsheet Applications, Word Processing Applications, and Database Manager Applications. Discussion of the development process covers competency objectives; curriculum development (scheduling, standardization, software programs to support specific course modules); and building in flexibility (feedback, revision, and evaluation). A course evaluation form is included. A brief overview of future directions includes additional courses, workshop format, credit courses, and a proposal to establish an information systems laboratory. (LMM)

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A Modular Approach to Building Adult Computing Competencies:

The DESKTOP COMPUTER SERIES

John J. Joseph

Data Processing

Instructor/Coordinator

Fox Valley Technical Institute

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FOREWORD

This paper describes an approach to teaching adults about computers. The program outlined is still evolving. Some segments have been completed and implemented. Student response to these has been uniformly enthusiastic.

Three basic premises underlie the overall program:

1. There is a widespread need for adult education related to desktop computers.
2. The needs are not the same for everyone.
3. To be effective, a program that addresses these needs must be flexible, pertinent and current.

INTRODUCTION

Alvin Toffler's "third wave" is sweeping the country, and the water is rising through our public education system. Microcomputers are becoming common in elementary, junior high, and high schools. Seeing the shape of the future, parents have adopted a new technology for their children. Now adults, too, must be trained in tomorrow's technologies.

Intrigued by newspaper, magazine, and television features, Americans are registering in record numbers for "computer courses." Often, these courses are designed for an audience other than the general public. Standard course lengths, semesters or quarters, have been the rule. A semester-long course in basic computer concepts may be of little use to a person trying to decide whether or not to purchase a $500 personal computer.

Formal adult education, aimed at specific jobs and careers is available. Broadbased, general, training which defines the application of new technologies is not.

Recognizing this gap in adult training, Fox Valley Technical Institute (FVTI) in Appleton, Wisconsin, is responding with a modular series of courses, designed to build a variety of computer competency levels.

FVTI maintains major education centers in Appleton and Oshkosh, the two largest cities in Wisconsin VTAE District 12. Demand for courses extends throughout the District. To satisfy the need for courses in outlying areas, FVTI offers classes at area high schools and three permanent regional centers. This course-delivery network is quite effective for teaching about microcomputers, since most high schools in the District have personal computers in their classrooms. (A fringe benefit of this approach is that many adults are learning about computers on the same equipment used by their school aged children.)

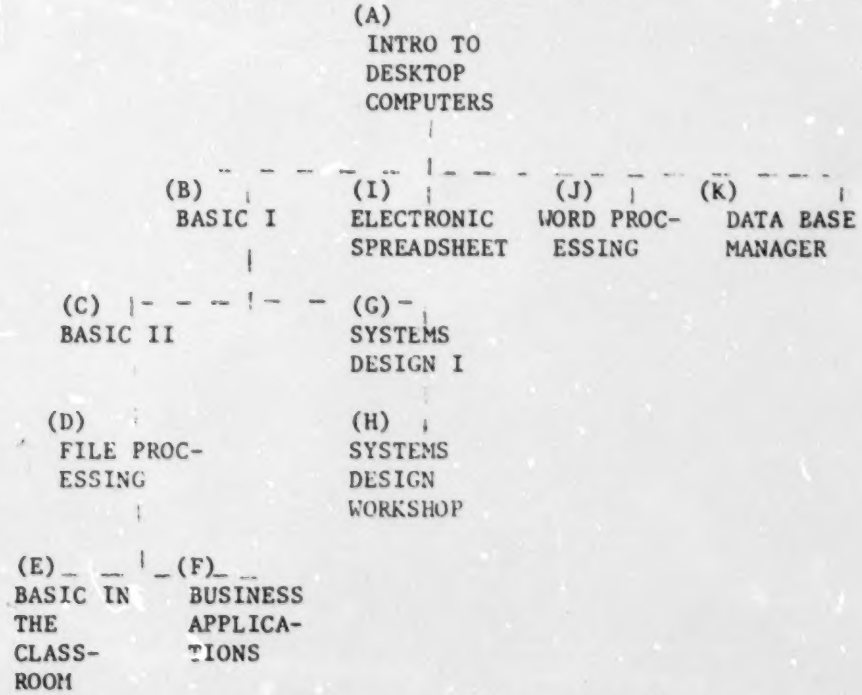
DESKTOP COMPUTER SERIES:

A Different Approach

FVTI's modular approach to producing adult computing competencies concentrates on desktop computer training. "Desktop" is used as a generic term, representing home computers, microcomputers, personal computers, and small business computers. Extensive training programs for large mainframe computers are already available from other sources (including FVTI and other schools in the Wisconsin University and VTAE systems). A series of short course modules was developed. Both general and specific audience interests are addressed.

The modules fall into a "natural" hierarchy. Figure 1 depicts that hierarchy. Figure 2 outlines the content and objectives of eleven course modules. (Alphabetic codes serve as a cross-reference between the two figures.)

FIGURE 1: DESKTOP COMPUTER SERIES COURSE HIERARCHY



The introductory module serves two purposes. First, many adults want to learn just a bit about computers. This course module helps to satisfy their need--with a review of terms and concepts, a segment on the history of computers, and hands-on exposure to desktop computers. Second, for adults who require more depth, Introduction to Desktop Computers builds a solid cornerstone on which further competencies can be established.

FIGURE 2: DESKTOP COMPUTER SERIES
COURSE MODULE DESCRIPTIONS

(A) Introduction to Desktop Computers
--Overview of microcomputer development and use
(Computer Assisted Instruction lesson)
--Principles of microcomputer operation
--Develop simple BASIC programs
--Use VisiCalc (c) for simple problems

(B) BASIC for Desktop Computers--I
--Introduction to program development (flowcharting, structure, ect)
--Expand subset of BASIC instructions
--Subroutines. Linking programs

(C) BASIC for Desktop Computers--II
--Array processing and sorting
--Building an application system
--"Professional" programming fundamentals (design, documentation, production systems)

(D) File Processing in BASIC
--Use of sequential and direct access files in BASIC programs
--File design for microcomputer application
--File handling and security (problems and procedures)

(E) BASIC in the Classroom
--Techniques for teaching BASIC programming
--Building problems and cases
--Developing programs for classroom use
...Elementary drill and practice
...Classroom management

(F) Business Applications in BASIC
--Case study development of business applications for desktop computers. (Cases may be custom fitted to specific classes.)

(G) System Design for Desktop Computers--I
--Principles of systems design and development
--Developing systems requirements specifications
--Package selection techniques

(H) System Design for Desktop Computers--II
--Workshop in design of student-defined systems

(I) Spreadsheet Applications
(J) Word Processing Applications
(K) Data Base Manager Applications
--Demonstration and use of commercially available software packages
--Where applicable, emphasis on student use of packages in their personal environments.

Many adults are interested in office applications. The most common applications packages currently in use are Electronic Spreadsheets, Word Processors, and Data Base Managers.

Course modules provide fundamental competencies in the use of each of these "generic" packages.

Three course modules deal with BASIC program development. Student assignments in each of the modules build on previously attained levels of expertise. Because access to microcomputers outside class hours may be limited, sample solutions are always available for student use. In this way, classes progress together from one concept to the next. At the end of a course module, each student has examples of programs that embody the concepts taught.

Two Systems Design modules deal with systematic development of applications programs and specifications. The first BASIC module is prerequisite to these modules, so students will have some exposure to the tasks of program development. A workshop format is employed in the second systems class. Working together, under the guidance of an experienced instructor, students develop actual specifications for applications systems.

A workshop format is also employed in two other courses. These are aimed at specific audiences. In BASIC in the Classroom, teachers are segregated by grade level and interest area. Then they develop group projects of mutual interest and use.

Business applications is also segregated -- between people from small and large business environments.

Additional courses will be developed as needs are identified. This core of eleven course modules provides a sound base for further development.

THE DEVELOPMENT PROCESS

The basic premises stated in the Foreword established the directions for this program. Needs are broad and varied. To be effective, responses must be flexible.

More concise objectives were defined in terms of the competencies which would evolve from the course modules. All competency objectives are based on "hands on" application of the desktop computer training.

COMPETENCY OBJECTIVES: Four general objectives were developed for the initial program. They span the entire program and reflect the general plan of addressing computing competency development needs. Planning for future competency development will be based on successful attainment of these initial objectives.

1. Understand the concepts and uses of desktop computers. Students should be able to relate to the development of computers, code a simple computer program, and use a computer to run packaged applications software. This competency is prerequisite to undertaking more advanced training.
2. Develop BASIC programs for desktop computers, using concepts such as array and file processing. All students will not require the same levels of expertise, and this training should be subdivided into multiple levels.
3. Develop the ability to apply the "systems approach" to problem solving. Students should learn to analyze a problem in terms of its logical components and then design a solution embodying the use of a desktop computer system.

4. Use commercially available software packages efficiently and effectively. Students learn to operate specific packages, including use of reference documentation and hands-on operation of the packaged systems.

CURRICULUM DEVELOPMENT: One of the concepts underlying the modular approach was that the time frame for course modules had to be shorter than the traditional 12 or 18 week blocks. FVTI has adopted a module length of 4 weeks. Classes meet for 2-1/2 to 3 hours each week. Outside assignments account for about 2 additional hours for each student.

For scheduling, the four-week modules are fitted into five-week calendar time slots. This increases flexibility for both students and instructors. For instance, one BASIC module might end with a large student assignment, to be completed during the two weeks following the end of the module. That assignment, then, might be the starting point for the succeeding module. Seven of the five week time slots fit nicely into a traditional 36-week school year. Each teaching location establishes its own schedule for course modules.

Because the courses are taught in a variety of locations, standardization is necessary to maintain quality control and accommodate students who may participate at different sites. Comprehensive Instructor's Manuals are developed for each of the course modules. While the manuals contain enough material to cover entire courses, instructors are encouraged to use imagination and ingenuity in presenting their modules. Module objectives and target competencies are

firmly stated in each of the manuals. Where they are applicable, sample computer programs and Computer Assisted Instruction (CAI) lessons are included in the manuals. Full-time staff members are available as resources for the part-time instructors who present the course modules.

Some software programs have been developed to support specific course modules. One CAI lesson deals with the history of computers. Another explains the Desktop Computer Series. BASIC programs capture and summarize student evaluations at the end of each class. Additional software will be developed as the courses go on -- including a collection of student-written programs and systems.

BUILD IN FLEXIBILITY: In adult education, flexibility is prerequisite to long-range program success. Good training modules, once implemented, must not be allowed to stagnate. The subject area, desktop computers and information processing, changes rapidly. It is imperative that course material be fluid and current.

Student feedback provides a sound basis for course revision. One measure of the effectiveness of a module is student interest, as reflected in attendance. Student comprehension and mastery provide another effectiveness measure. Since the courses are ungraded, students rate their own comprehension levels.

At the last session of each course module, students complete a 12-question course evaluation form (see Figure 3). Each response is recorded on a continuum. Using a desktop computer system, mean and modal results are calculated for each question. These results are then analyzed and compared to similar returns from other sections of the same module. (Often, the results are tabulated during the class period. Students then see the practical output of a simple computer system.)

FIGURE 3: COURSE EVALUATION FORM

COURSE EVALUATION Course Name: ----------

The best time to evaluate anything is while it is fresh in your mind. Now that this course is nearly over, please take a few moments to complete the questions below. The results of these evaluations are tabulated and used as input to the course review/revision process.

INSTRUCTIONS: Circle the number that best represents your opinion of the statement or question. If you have no opinion, or the question is not pertinent to this course, circle the number 3.

QUESTION	RESPONSE		
1. This course was interesting.	VERY	5 4 3 2 1	BORING
2. The course was difficult.	QUITE	5 4 3 2 1	SIMPLE
3. The course was of value to me.	AGREE	5 4 3 2 1	DISAGREE
4. The general quality of instruction was...	HIGH	5 4 3 2 1	LOW
5. I would recommend this course to others.	DEFINITELY	5 4 3 2 1	NEVER
6. Course objectives were presented clearly.	AGREE	5 4 3 2 1	DISAGREE
7. I achieved my personal objectives in this course.	AGREE	5 4 3 2 1	DISAGREE
8. Directions for activities were clear and understandable.	AGREE	5 4 3 2 1	DISAGREE
9. The quality of materials used in the course was...	HIGH	5 4 3 2 1	LOW
10. Discussion and work groups were helpful to me.	AGREE	5 4 3 2 1	DISAGREE
11. The course was well organized.	AGREE	5 4 3 2 1	DISAGREE
12. The amount of hands-on computer use was about right.	AGREE	5 4 3 2 1	DISAGREE

Thank you. Your input will be valuable to students who take this course in the future.
PLEASE WRITE ANY ADDITIONAL COMMENTS ON THE BACK OF THIS SHEET.

Finally, student comments are solicited at the end of each class. A general discussion period is part of the final class meeting, and suggestions may be made verbally. If students prefer, they may enter comments anonmously on the course evaluation questionaires.

FUTURE DIRECTIONS

Although the entire series is not yet implemented, there is already a great deal of interest in its future expansion. The DESKTOP COMPUTER SERIES will serve as a cornerstone for several new and innovative approaches to building computing competencies. Because flexibility is part of the program's design, changes should enhance rather than disrupt the program.

ADDITIONAL COURSES. Modules dealing specifically with agriculture uses of desktop computers are already being investigated. This is a logical next step, based on the demographic composition of the FVTI District. Other areas that are currently under study include CAI Authoring Languages and Systems, Speech Synthesis, and use of videotape equipment under the control of a microcomputer.

WORKSHOP FORMAT. Some of the initial modules utilize a workshop format, where students will develop practical, usable software tools. As interest and enrollment in the program grows, additional special interest groups can be identified. New workshops will be developed to satisfy their special needs. As part of these workshops, software packages will be solicited from publishers for evaluation by an informed, interested student body. These workshops should also provide an excellent forum for exchanging information and student-developed software.

CREDIT COURSES. VTAE credits are not offered for any of the modules in the initial offerings. However, FVTI is proposing to the state VTAE Board that selected modules be considered as credit courses. If approved, the modules will be melded into the existing Data Processing Associate Degree program. Students may take selected modules either as elective courses or as part of a "Small Shop Specialist" option. This option will provide concentrated training for students interested in using small computers in business.

INFORMATION SYSTEMS LAB. FVTI is currently evaluating a proposal to establish in Information Systems Laboratory (IS Lab). The IS Lab will contain a variety of microcomputing hardware and software. Here faculty, students, and others from the FVTI District can meet to solve specific problems. While the majority of course modules are taught at outlying locations, the IS Lab will be centrally located, for use by persons from throughout the District.

SUMMARY

Parents, teachers, accountants, scoutmasters, homemakers, engineers, gas station owners, and farmers all have demonstrable, but different, reasons to develop competencies in computing. Some needs are quite similar, while others are unique. No one solution will meet them all.

Developing a variety of computing competency levels is one of the greatest challenges facing educators today. Traditional courses do not appear to be the answer.

A cohesive series of short modules, integrated to allow students to select those which lead to the levels of competency they desire, provides an effective, managable approach.

FVTI's DESKTOP COMPUTER SERIES addresses the problems in a systematic way and provides a workable method for developing a network of courses to build a variety of computing competencies.